An Overview of Aural Rehabilitation from Hearing Screening through Intervention

An Honors Thesis (HONRS 499)

by

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Abstract

Hearing impairment affects children each and every day. In the past, it was thought that children with hearing losses could not acquire the normal language that their hearing peers do. Now, however, with the help of new technology, current laws, and early intervention, children with hearing impairments can develop normal language. This paper will discuss early identification and intervention, current technology, and current laws all of which can lead to children with hearing impairment acquiring normal language.

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An Overview of Aural Rehabilitation from Hearing Screening through Intervention

Children's language development is very important to their overall life. Having a hearing impairment can impact their language in many ways, but with the help of new technology and therapy, these children with hearing impairment are beginning to develop normal language. This paper will discuss the types of hearing loss and language problems children have had in the past in comparison to those currently. It will explain the different kinds of hearing losses, how early identification and intervention are so important, and the impact of current technology. With the help of many professionals, current laws, and new technology, children with hearing impairments can live normal hearing and speaking lives.

There are different kinds of hearing losses that children may have. There are three groups into which hearing loss are divided: conductive, sensorineural, and mixed conductive-sensorineural hearing loss. A conductive loss is one that occurs in the middle or outer ear, while a sensorineural loss is found in the inner ear. A mixed hearing loss occurs when there is a problem in the inner ear as well as either the middle and/or outer ears (Tranebjarg, 2008). Hearing losses can also be classified by severity, or by how much the hearing impairment blocks the child's sound reception. We will focus most on the profound hearing sensorineural loss in children. A mild hearing impairment falls between 26 to 40 dB HL. Here, the child may miss 25 to 40% of the speech signal. The child can miss up to 50% of class discussions with a loss of 35 to 40 dB HL when the voices are soft or further away. A moderate hearing loss is at 41 to 55 dB HL. Here the child can miss 50-75% of speech, especially at a distance. He or she would have trouble hearing in conversations as well as the consonants in words. A hearing impairment of moderately-severe degree is at 56 to 70 dB HL; this is when a child would need amplification technologies. Without any amplification, he or she may have delayed language, syntax, reduced

speech intelligibility, and social behaviors. Severe hearing impairment occurs at 71 to 90 dB HL. The child cannot hear conversational speech without amplification, and with the right amplification the child should be able to detect all speech sounds. Finally is profound hearing impairment which occurs at 91 dB HL or greater. The child would not be able to hear any sounds here without amplification. Amplification may or may not be helpful at this point, depending on many factors. Some of those include: age of amplification, type and intensity of early intervention, family support, and the amount of residual/remaining hearing (Flexer, 1994).

There are many different ways to aid the child with a hearing loss depending on the severity and type they have. It is vital to see an audiologist so that one can decide which one may be best. Luckily, there are new technologies to aid children. Having improved systems makes the success of language development greater. First, one would look into using a hearing aid (Bess, 1998). Hearing aids are a very important resource for the rehabilitation of children with hearing impairments. Some common problems include clogged ear molds, weak batteries, intermittent controls, cracked tubing, poor frequency response, and excessive distortion. Because of this, hearing aid maintenance is quite necessary. Hearing aids can be very helpful, but they must be working properly for children to gain the complete benefit of them. Ongoing daily monitoring and maintenance of children's hearing aids are simply important. Many lack the knowledge of the aspects of amplification. Quite commonly, teachers, nurses, and speech language pathologists have been found to have very limited knowledge about the hearing aids in the areas of operation and care. Parents also have can lack the knowledge as well about their children's amplification technology. People working with the hearing impaired child should have the working knowledge of the amplification devices, and then the child can have the maximum benefit of their amplification (Roeser, Downs 2004).

If the child does not benefit from his or her hearing aids, the next option would be a cochlear implant. A cochlear implant is a good choice for children who have profound deafness, but do not benefit from hearing aids. Children as young as twelve months of age can be implanted. Cochlear implants work by converting mechanical sound energy into electrical signals that are delivered to the cochlear nerve. For cochlear implants to be the most effective, early identification is crucial. To decide whether or not one would be a good candidate for a cochlear implant, there must be an audiological assessment, medical assessment, psychological testing, age considerations, as well as looking at the age of onset. Surgical implantation must be done very carefully in children. Complications are not completely avoidable, but are very rare. All in all, cochlear implants can be a great choice for some clients and can improve speech perception, speech production, and intelligibility (Bess, 1998).

Research continues to show the benefits cochlear implants have on children who are profoundly deaf. These children fitted with cochlear implants are found to have developed spoken language skills that are quite close to those of their hearing peers. However, early cochlear implantation does not ensure that the child will have normal language development. Many years of intervention in school, therapy, and at home are necessary for the child to achieve normal language skills (Nicholas, Geers, 2008).

Noise, distances from a speaker, and reverberation can all affect one's hearing, with or without amplification. Assistive listening devices can help children hear better while in school to help the children understand and hear spoken communication. Two types of assistive listening devices are classroom amplification systems and personal FMs. Classroom amplification systems are wireless high-fidelity public address systems and are self-contained within a classroom. The teacher or parent uses a wireless FM microphone transmitter when speaking and his or her

speech is transmitted by a radio signal. Commonly, there are many background noises and the children may get distracted, especially further in the back in the classroom. Having an amplified voice can help all children and especially those with mild hearing losses. They can concentrate more on what the teacher is saying, no matter where they are sitting in the classroom. These are good systems for all students and those with mild hearing losses, but they are not very helpful for children with more severe hearing losses. A personal FM system might be more helpful for all children with hearing loss (Mahsie, Mosely, Lee, Scott, 2006).

Early intervention is key for the best language development of children with hearing loss. Advanced technology will make a large difference, but if the child is identified later in life, the amount of success with language may be decreased. Early identification will be discussed first, and later, therapy techniques will be summarized. Newborn hearing screening nationwide is mandated by law in the United States. The United State Public Health and Human Services and the Joint Committee on Infant Hearing (JCIH, 2004) have been working hard to implement universal hearing screening programs. All neonates within hours of birth are screened. Any hearing disorders found are immediately remediated. The objective hearing screenings measures can include Otoacoustic Emission (OAE) or Auditory Brainstem Response (ABR) tests and should be done by one month. There is a one-three-six principle. All newborns should be screened by one month of age. After screened and if they do not pass the second screening, they should have their hearing loss identified by three months. Within six months of age, the child should be enrolled in an auditory rehabilitation program and fitted with amplification (Roeser, 2004).

Once children are screened for their hearing, any problems should be further investigated. Audiological diagnoses that are confirmed by three months of age should start early intervention

by six months. Research by Christine Yoshinaga-Itano (2009) has shown that children with hearing impairment who have started early intervention by six months of age are more likely to learn language at a rate similar to their peers who can hear normally. The approach that is most common for early intervention is a parent-centered one that uses an auditory-oral approach. It focuses on the parents and other caregivers and does the following: provides parents with the information about the hearing loss, supports the emotions of the parents, and it teaches strategies that can be used to help the child develop normal language. There should also be a collaborative approach between the parents and the professional. Another kind of approach is for the older child: a child-centered therapy. The professional would work directly with the child and the goal(s) would be the same for language development. The parents could observe the therapy sessions, but the professional would be the one providing the one-on-one therapy. Having the parents participate in therapy allows for them to carry-over the teaching process in the home environment and everyday situations (Katz, Medwetsky, Burkard, Hood, 2009).

During early intervention, many things are targeted. The use of amplification, development of auditory skills, speech, prelinguistic communication, language, and cognition are all important areas. No matter what kind of approach one chooses, Part C of the Individuals with Disabilities Act requires that early intervention is to be done in the natural environment of the child. Usually the services are provided in the home; it should be a place that is typical for the family and somewhere familiar for the child. This increases the chances of the child using what is done in therapy at home and in the community (Katz, et. al., 2009).

"Early intervention" ends when a child reaches three years old. The child should start the transition from early intervention to the preschool services around two and a half years. Once the child enters the preschool, the instruction will be based on language pertaining to their

preacademic skills. There are many options for preschools for the hearing impaired child. The parents can choose the least restrictive and enroll their child with normal hearing children. A more restrictive option is to enroll the child in a preschool that has other children with different types of disabilities in the same classroom. Finally, the parents can enroll their child in a center-based program. This program enrolls many hearing impaired children in one classroom. There are checklists designed to help the parents choose the best fit for their child, and parents should visit the preschools before making their final decision (Katz, et. al., 2009).

Arlene Carney and Mary Pat Moeller (1998) also have done many studies on the importance of early intervention. They state that early intervention is the first step in decreasing the effects hearing loss can have on language development. Carney and Moeller also believe that a family-centered approach is very important. They discussed some research that was done for deaf students on reading. It was found that those who had better language and literacy skills were children who came from homes where the parents supported the child and had a positive impact on him or her (Carney and Moeller, 1998).

Carney and Moeller also looked at different kinds of intervention approaches. When discussing the auditory verbal approach, a study examined oral speech and language skills of adolescents with profound sensorineural hearing loss who had been educated with auditory oral or residual total communication environments. What they found was that the adolescents who had auditory oral programs had better speech perception and production, as well as better oral language proficiency skills (Carney and Moeller, 1998).

Finally, Carney and Moeller (1998) discuss long term outcomes of the deaf or hard of hearing students. They found that the deaf students who had quality intervention programs had a much higher level of literacy than those who did in the past. These programs had treatment goals

that include the following areas: sensory and perceptual skill development, language development, speech-production skill development, academic performance, and social-emotional growth. Carney and Moeller also looked at the benefits of early intervention. They found that there was age-appropriate language and academic performance for the hard of hearing students who had been able to experience appropriate intervention services. One cannot argue against the fact that early intervention is very important in the success of hearing impaired children. New technology and programs have made it possible for these children to acquire normal language skills (Carney, Moeller, 1998).

Because we learn language through hearing, children with hearing impairment are continually challenged when it comes to language development. Hansson et al (2007) did a research report on children with hearing impairment and how it affected their language development. She specifically studied children with mild to moderate hearing impairment. She found that often they have problems with their phonological short-term memory (PSTM) and that they have significant language problems quite similar to children with specific language impairment (SLI). These language problems can include: shortened sentences, word finding difficulty, and difficulty learning new words. Children with hearing impairment often have a language delay which may include weak vocabulary and verbal reasoning skills. These children may also have impaired phonological processing skills, and problems in finite verb morphology. Although they often do slightly better than children with SLI, the important part is that they do more poorly than children with normal hearing. It is very important to recognize that these children with hearing impairment will have a more difficult time with language development. One must realize that just because the child may have hearing aids or cochlear implants does not mean that they can hear everything clearly. The process is much more complex and lengthy, and

the child will not hear everything as clearly as those born with perfect hearing. Children with hearing impairments continue to miss out on many of the things said every day, and therefore they need extra attention and aid to learn their language (Hansson et al, 2007).

When Fellinger et al (2007), researched the mental health of hearing impaired children, he found some interesting things. He saw that bilateral permanent childhood hearing impairment was commonly associated with communicative, cognitive and socio-emotional developmental consequences. He explained that when looking at studies on deaf children and their mental health, there were increased rates of psychosocial problems and many psychiatric disorders. When evaluating these children's mental health and well being, the topic of quality of life was often brought up. The quality of life concerned the individual's satisfaction with his or her functioning in everyday life including the physical, emotional and social functioning. Throughout Fellinger's study, he found that students with hearing impairment need additional support when it comes to their mental health and quality of life. He discovered that the degree of hearing loss had no impact on the mental life, but that overall, all hearing impaired students should receive extra support in their educational setting. He believes that this support will lead to an earlier identification of mental disorders, and that teachers, parents, and other professionals should all be included and aware. All of these people should also receive specific training in programs concerning mental health so that they will be ready and able to aid the children. They also must remember to be on the lookout for such problems in students with hearing impairment (Fellinger et al, 2007).

There are many kinds of therapy for hearing impaired children. The current approach is an auditory-verbal approach. This kind of program stresses a unisensory approach to develop language. The primary goal of this approach is to develop the spoken language through the use

of amplification—the cochlear implant, hearing aid, or FM system, as well as intensive listening training. This kind of training is done without any visual cues so that the child must use only his or her hearing to the maximum. Children are taught how to learn to listen and learn by listening. The use of speech reading or lip reading is minimized so that the child does not rely on visual cues to hear (Mahshie, 2006).

Speech-language pathologists need to provide aural rehabilitation with children who have hearing impairments. Aural rehabilitation is the use of strategies to overcome the handicap of hearing loss. It can involve lipreading, auditory training, and counseling. For children, the purpose of aural rehabilitation is to reduce potential negative outcomes of a prelingual hearing loss to the greatest extent that is possible. The goal is to restore a lost state or function with acquired hearing loss. SLPs should have knowledge in many areas to be qualified for aural rehabilitation. These areas should include: characteristics of hearing impairment, effects of hearing loss on the client, communication strategies, auditory training, speech reading, and amplification. Each client will vary with the type of hearing impairment they may have, but knowledge in all those areas will help the SLP be prepared to assist the client in the specific way they may need. The process of aural rehabilitation should go in a progression starting with the assessment of the hearing, the assessment of the benefits amplification for the client, and the assessment of the impact of hearing loss on the individual. All of that can be done by the audiologist and then the audiologist can refer the client to the SLP for the aural rehabilitation. The SLP will do counseling, modifications of client's communicative environment, and the teaching of language, speech reading, and auditory training. Involvement with other professionals is important, as in all programs. Also, education and involvement of family will create a positive environment and may strengthen the auditory rehabilitation program for the

client (Updike, 2009).

Because of all of the new technology and services, children with hearing impairments are acquiring normal language skills. Yoshinaga-Itano et al. (1998), have done a lot of research on these children and their language. She has compared the language abilities of early and late identified hearing impaired children to see what differences she could find. She and three other professionals looked at the receptive and expressive language abilities of children who were deaf or hard of hearing. They compared 72 children who were identified before six months of age to 78 children identified after six months of age. All of these children received the early intervention services at about two months after being identified. They used the Minnesota Child Development Inventory to measure the expressive and receptive language skills of these children. What was found through this study was that children who were identified before six months of age had much better language scores than those who were not. This was found across all ages, degrees of hearing loss, communication mode, and socioeconomic status. This advantage also was found to be independent of gender, minority status, and whether or not there was a presence or absence of other disabilities. They concluded then that language development is significantly better for those who are earlier identified and have early intervention (Yoshinaga-Itano, Sedey, Coulter, Mehl, 1998).

Pratt (2005) writes about aural habilitation and the role of speech production skills for infants and children with hearing loss. She stated that it was quite rare for hearing impaired children to acquire speech skills and that less than 20% of their words were intelligible. Now with early identification and intervention, the number of intelligible children with severe to profound hearing loss has increased. They are developing sufficient speech perception, production, and oral language. Sensory aids have also impacted the increase in normal language

development. It has been found that early cochlear implantation does relate to more normal oral communication development. She says that there is growing literature that does support the belief of the positive impact cochlear implants have on speech development. She emphasized the important role of the auditory-oral approach for language development (Pratt, 2005).

Continuing preschool screenings is important. Although some children may already be receiving therapy for hearing impairments, there are still some who may have late onset or acquired hearing loss. These children are also susceptible to having delays in their language. A study done by Serpanos and Jarmel (2009) looks at the outcomes of a preschool hearing screening program. Although most children pass the hearing screenings, there are many who do not. There was an overall pass rate of 82%, and those who did not pass had further testing. By having these screenings, they could find children between the ages of three and five who had acquired hearing loss. From there, further intervention could be possible so that the child would not acquire problems with speech and language skills, behavioral development, and academic performance. Through this study, Serpanos and Jarmel wanted to make it clear to all that preschool screenings are vital as well as the follow up services (Serpanos and Jarmel, 2007).

MacNeil, Liu, Stone, and Farrell (2007) evaluated satisfaction with early hearing detection and intervention in Massachusetts. Massachusetts programs have reached a screening rate of higher than 99% since the implementation of universal hearing screenings. In 2004, 83% of those who did not pass the initial screening received audiological evaluations by three months and a total of 89% received evaluations. Altogether 75% of these children received early intervention services. JCIH (2007) wanted to acknowledge the importance of the parents' input on the early hearing detection and intervention. They did this to better understand the parents' expectations as well as to improve the program in any way possible. After 1,106 Massachusetts

families responded, it was found that parents had high levels of satisfaction with the services. There was a low degree of parental worry and a lot of support for the universal newborn hearing screening. There was some anxiety about false-positive screens, but the lasting anxiety was very minimal. All in all, the study showed how well the screenings have been working and how satisfied the families are with it. Newborn hearing screenings are crucial and can make a huge difference to the children diagnosed from them (MacNeil, Liu, Stone, Farrell, 2007).

All in all, our society has a made a lot of progress when it comes to people with disabilities. It was once thought that handicapped students should be kept separate from typical students in classrooms. Now, because of the Individuals with Disabilities with Education Act (IDEA, 1990), the new name to Education for all Handicapped Children Act, there are some major provisions. One provision in particular, The Inclusion Movement, requires these children be in the least restrictive environment (LRE) as possible. This provides that education should be with non-disabled peers to the maximum extent as possible, that there is a continuum of alternative placements, and that it should be determined individually, based on the student's evaluations. Because of these mandates, there has been a great reduction of the number of hearing impaired students enrolling in schools for the deaf, and because of that, more and more hearing impaired students are being integrated into the general classrooms. It is very important to keep these children integrated with other hearing children if possible. If these children want to acquire normal language development, then spending time with normal hearing peers is crucial (Doster, Ploter, 2008).

Education is crucial to everyone about children with hearing impairments. Just because the child may have a disability does not mean that it should affect their life entirely. People working with these children should understand their problems and how to best serve them.

Speech-language pathologists, audiologists, parents, teachers, and many other professionals will be working with these children. Having good knowledge and collaboration together is important for the child's success. Many times these children are looked over, misdiagnosed, or not helped to the extent needed. Universal newborn screening and school screenings are very important in identifying them. Implementation of the laws such as IDEA, the inclusion movement, and Public Law insures that these children are to be aided as much as possible. Their development, learning, and language can all be affected, but with the help of therapists, parents, and teachers, these children can still learn and live like any other. Continued knowledge and awareness can make a huge difference to these children for life.

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